SAFER FOODS FOR AMERICA

ARS Research on Alternatives to Pesticides Use

United States Department of Agriculture
Agricultural Research Service

Alternatives to Pesticides

Table of Contents

Subject	Page
Safer Foods for America Briefing Paper, Dr. Coppedge, NPL	1–5
Summary Table of Funding for ARS Pesticides–Related Programs	6
Minor Use Pesticides–Funding by Location	7
o Minor Use Pesticides (Durbin)	8–9
IPM–Funding by Location	10
o IPM–Headquarters Funds	11–14
o Pilot Test–Headquarters Funds	15–19
o IPM (Specter)	20
Biocontrol Research–Funding by Location	21
o Briefing Paper, Dr. Krysan, NPL	22
Non–Chemical Pest Control–Funding by Location	23–24
Chemical Pest Control–Funding by Location	25
Sustainable Agriculture–Funding by Location	26–27
o Sustainable Agriculture (Durbin)	28–29
Fruit Fly Research by Type/Funding by Location	30
o Briefing Paper, Dr. Coppedge, NPL	31
o Fruit Fly Eradication (Durbin)	32
Alternatives to Methyl Bromide–Funding by Location	33
o Alternatives to Methyl Bromide (Cochran)	34
o Briefing Paper, Dr. Vick, NPL	35

Safer Foods for America - At What Cost?

The Agricultural Research Service (ARS) firmly believes that pest management systems employing biologically-based or other pest-specific technologies can lead to substantial reductions in the use of pesticides and in the long run result in large savings to agriculture. This is clearly reflected in the fact that in the last 20 years ARS has changed from mainly evaluating new pesticides to a program today in which over 80% of all of the pest control research is directed towards developing alternative technologies and strategies for pest management. The implementation of pest management systems using biologically-based control technology rather than synthetic chemicals and the adoption of these systems by producers, would be a significant move towards increased sustainable agricultural systems. In ARS programs today, over 25% of the research dollars spent contribute to a more sustainable agriculture.

ARS and scientists from other agencies have made outstanding progress in a number of areas that offer opportunities for achieving pest control at a low cost and in an environmentally sound manner. Some of these improvements which I will discuss later in this presentation are being used by producers today, however, many are not. It is the nature of biologically-based and other pest-specific procedures that they are more effective on an area-wide basis. The evaluation of these technologies/strategies on this scale requires both time and a considerable expenditure of resources. Commonly, for farmers, consultants, and pest management organizations to adopt new insect or disease control practices, it is necessary to demonstrate, on a commercial scale, that the new strategy is effective, practical and safe.

Although, there are many constraints to the development of biologically-based pest management systems, there are some successes which scientists feel are indicative of what is possible in the future. As mentioned previously, the ARS crop protection program is devoted to developing and evaluating technologies to replace synthetic pesticides and to otherwise achieve food safety and environmental quality goals. Rarely does a single new technology result in an effective and sustainable pest management system; more frequently, these new technologies must be combined with other environmentally benign approaches into what is commonly called an integrated pest management (IPM) system. Pest management programs are based on three broad areas of pest control including biological control (i.e. beneficial insects and microorganisms, insect or plant disease specific pathogens, host plant resistance, sterile insects, sex pheromones for mating disruption), cultural control (i.e. timing of planting crop rotation, sanitation, mulching, soil solarization, fertilizer and water management), and chemical control. In the context of IPM, chemical control is used as a supplement to biological and cultural control and not as a replacement for these approaches.

<u>Biological Control</u>

In any discussion of biological or biologically-based pest control it would probably be remiss not to mention, at least in passing, our single most outstanding success--the Screwworm Eradication Program. Before this program, this flesh feeding insect frequently attacked warm-blooded animals including livestock, wildlife and occasionally humans. It was especially prevalent in the warmer climates of the U.S. Its damage annually resulted in the loss of

millions of dollars of revenue to livestock producers and other land owners. Additionally, most domestic animals in infested areas were frequently treated with insecticides by either dipping the whole animal or by spot treatment. The screwworm was eradicated from the U.S. using an area-wide release of radiation sterilized insects and improved ranching practices. This highly successful program has resulted in a substantial reduction in pesticide use in the United States and Mexico (where it has also been eradicated).

The development of crop varieties with improved qualities including insect and disease resistance is a very successful but continuous process. Our crop varieties already have a relatively high degree of resistance to many of the common pests but pest organisms are constantly evolving and adapting in spite of our ever improving pest management strategies. The new whitefly biotype that has recently caused so much damage to a wide variety of crops in this country is a good example of an insect's ability to change and adapt to its environment. It is likely that such pest outbreaks will continue with or without use of pesticides.

Our ARS scientists have developed close working relationships with scientists of our State Agricultural Experiment Stations and together they have introduced much of the crop germplasm and many of the new improved grain, fruit, and vegetable varieties now being grown in this country and around the world as well. ARS introduces about 300 improved varieties and germplasm each year and over 80 percent of these new introductions are cooperative with the States and/or the private sector. In all cases, our scientists are striving to develop improved resistance to our major pests. We know from experience that it is unrealistic to think that we can develop crop varieties that will be immune to pest damage. But we believe that continued breeding for pest resistance is the best long-range strategy that can be augmented with biological control or methods of integrated pest management. This is the best way to combat pests and help reduce the use of pesticides.

Our long standing effort to develop pest resistant varieties is paying good dividends. Over the last 12 years, ARS has introduced over 3,550 new varieties and germplasm lines, including a large number of new fruit and vegetable varieties. Of all introductions, 81 percent have had improved resistance to diseases and 31 percent with improved resistance to insects.

For many years, the continental U.S. has been invaded by pestiferous fruit flies, i.e. medfly, Mexican fruit fly, oriental fruit fly, etc. If these invasions are not dealt with on a swift and decisive basis, they can become established and cause hundreds of million of dollars in crop losses and result in the application of millions of pounds of insecticides. For the most part, these invasions have been successfully dealt with by the use of releases of sterile insects or male annihilation systems. Under the most severe conditions, insecticide bait sprays have been used in the past, however, the amount of pesticide applied is only a fraction of the amount that would be applied if these pests were to become established in major fruit and vegetable production areas. Currently, ARS is researching a promising alternative to bait sprays.

A biocontrol agent, the fungus Gliocladium virens, has been developed by ARS scientists to control/manage several seedling diseases of vegetables such

as snap beans and carrots (and ornamentals) caused by soilborne fungi. Several formulations of these biocontrol fungi have been developed by ARS in cooperation with W. R. Grace & Co. One of these is being marketed under the trade name, "Gliogard". In some cases, the biocontrol formulations are as effective as fungicides in reducing disease and increasing yield. Other fungal biocontrol agents are being developed (i.e. identified, evaluated and formulated) to control soilborne diseases of lettuce, radish, eggplant and sugar beet. These biocontrol agents are also being developed for use with combination with other cultural practices (e.g. soil solarization) to enhance their overall efficacy to control soilborne pathogens with reduced or no chemical pesticides. Use of these agents to manage soilborne fungal diseases of vegetables is expected to result in the reduced application of chemical pesticides (e.g. fungicides) to the soil.

Several microorganisms (bacteria, fungi, yeasts) have been identified as biocontrol agents for a number of postharvest diseases of fruits and vegetables, including botrytis rot of strawberries, and a variety of rots of citrus, pears, apples, nectarines, peaches, apricots, plums, grapes and tomatoes. As with preharvest plant diseases, use of these biological control agents is expected to result in the reduction of chemical fungicides to control postharvest diseases of fruits and vegetables. Large scale tests of several of these biological agents are currently underway. In addition, enhancement of the biocontrol activities of some of these agents by nutrient application or manipulation of the storage environment is being developed. ARS scientists developed the first patented biological control agent, the bacterium Bacillus subtilis, for the control of a postharvest disease, brown rot of stone fruits.

The worm in a wormy apple is the immature codling moth. Today, nearly all apple orchards of the U.S. are sprayed with synthetic insecticides for codling moth about 3 times per season. A non-insecticidal method for codling moth control, called mating disruption, involves dispensing in the orchard, the sex attractant of codling moth. The sex attractant is a perfume-like material that females release to attract a mate. The extra attractant masks that released by the female, mating is prevented, the applies don't get wormy, and sprays are reduced from 3 to 1 per season. The dispensers for this new technology are marketed commercially and the use is being developed through cooperative efforts of agricultural scientists, extension agents and the commercial interests. During 1993, mating disruption is in use in the U.S. on about 12,000 acres (of a total 480,000 acres). Use today of mating disruption of codling moth is complex and risky and is limited to highly motivated growers wishing to reduce pesticide use. In Washington State a study of 16 farms in 1991 and 1992 revealed that costs in orchards using mating disruption exceeded costs in standard orchards by $76 per acre. Improvements in economics can be expected as experience is gained.

In New Jersey the use of insecticides for Colorado potato beetle on eggplant is reduced from about 10 or 20 applications per year to about 5 or 6 applications per year by release of a parasite that attacks eggs of the beetle. The program covers about 49 acres this year and is limited in extent by the ability of the State of New Jersey to produce the parasites.

Pioneering ARS research led to the development of the microbial insecticide, Bacillus thuringensis. Several decades of effort by public and commercial scientists has led to success in the marketplace, but its use in most cases, compared with conventional synthetic insecticides, is more costly and demands greater management skills on the part of the farmer.

The methods mentioned above are very target specific. That is, they tend to work only on a particular pest. There are many other biological or biologically derived systems for controlling pests of fruits and vegetables that are similarly specific. They depend on the production and sale of living insects as biological control agents. A major constraint to their implementation stems from this specificity; markets are small and sometimes local. Today, there is a struggling group of producers of biological control agents (a market of about $25 million per year, nationwide). Encouragements are needed to foster the development of the commercial structure which, together with the public research and farmer education, could develop this approach to the further reduction of pesticide use.

Cultural Control

Field plots infested with soilborne plant pathogens have been amended with composted sewage sludge. The incidence of seedling diseases of several pea varieties in both spring and fall plantings in these field plots has been significantly reduced over a period of four years. The beneficial effects of the composted sewage sludge is attributed to the induction of suppression in the soil of the pathogens. The beneficial effects of other municipal and industrial wastes on reducing plant disease incidence during production are being evaluated. This approach to plant disease management during production will result in reduced application of chemical pesticides (e.g. fungicides). In addition, this practice also benefits sustainable agriculture directly.

Use of appropriate cover crops to reduce disease and insect pests of horticultural crops is being developed by ARS scientists. Hairy vetch, a legume that forms a plant ground covering or mulch, can increase yield and reduce insect (e.g. Colorado potato beetle) infestation of tomatoes. Hairy vetch is a legume that results in nitrogen being added to the soil, thereby reducing the amount of fertilizer needed. In addition, the water holding capacity of the soil can be increased with organic rather than plastic mulches. Cover crops used to manage specific plant pathogen or insects must be selected judiciously so as not to exacerbate other pest problems.

Chemical Application

ARS scientists are developing new/improved technology for the application of chemical pesticides to reduce their adverse impact on the environment and to increase worker and consumer safety. Some examples are improved nozzles and application equipment to insure a higher deposition of pesticide material on target crops, chemigation, encapsulation of pesticides to insure proper placement and sustained release and sensors to detect and selectively treat weeds in crops. This is expected to result in better control of the fate of chemical pesticides applied to the soil to restrict movement of these into ground and surface water and into products for consumption. Specifically,

improved technology is being developed for the application of reduced amounts of chemical nematicides to control nematodes in intensively irrigated crops, including cucumbers, green and other leafy vegetables, tomatoes, sweet corn, soybeans and potatoes.

The Cost of Safer Foods

In spite of the progress that has been made in developing alternatives to pesticides, the fact remains that the production of food crops, especially fruits and vegetables is highly dependent on synthetic pesticides. This can be clearly pointed out by reviewing the 1992 pesticide usage on 2 popular vegetable tomatoes and head lettuce. In the United States 75% of tomato acreage was treated with herbicides, 95% was treated with insecticides and 86% was treated with fungicides; while for head lettuce 86-96% of the acreage was treated with herbicides, 97% of the acreage was treated with insecticides; fungicide use was not reported. Since each pesticide application represents a reduction in the producer's profits, we must assume that the producers felt these applications were necessary for economic crop production. The question is can pesticide use be reduced. We strongly feel that the answer is yes, but there is a cost. First, insecticides can be evaluated and residue studies done on small acreages (plots of less than 0.1 acre are common) and once pesticides are registered they usually have applications across many crops and pests. Conversely, biologically-based technologies require much larger acres (1000 acre test plots are not uncommon) and they are usually pest and sometimes crop specific. The development of alternatives to synthetic pesticides will clearly require a major commitment to this type research. Additionally, over the years the general public has placed increasing demands on our farmers to produce and market crops that are totally free of insect and disease damage and free of any blemishes or abrasions of any kind. Our market grades, particularly for fruits and vegetables, have often been based on appearance and consumer acceptance. This has encouraged increased use and dependence upon pesticides. We hope that consumers will understand that acceptance of minor blemishes on fresh market commodities will allow reduced use of pesticides, without sacrificing nutritional quality or wholesomeness. Certainly any organically-grown produce or produce grown without use of pesticides can be expected to have minor imperfections caused by insects and diseases.

Finally, more attention must be given to very large-scale area-wide research programs to validate and demonstrate new pest management strategies. Emphasis must be on prevention of pest population buildup, rather than treatment of high levels. Farmers will not voluntarily adopt some of the new methods until they are confident they will work and be profitable.

James R. Coppedge
7/16/93

[illegible] is being developed for the application of [illegible] cides to control nematodes in intensively [illegible] cucumbers, green and other leafy vegetables, tomatoes, sweet [illegible] and potatoes.

[illegible] pite of the progress that has been made in developing [illegible], the fact remains that the production of food [illegible], especiall[illegible] vegetables is highly dependent on synthetic pe[illegible] out by reviewing the 1982 pesticide usage [illegible] head lettuce. In the United States, [illegible] with herbicides, 95% was treated with [illegible] with fungicides; while for head lettuce 86-96% [illegible] with herbicides, 97% of the acreage was treated with [illegible] was not reported. Since each pesticide app[illegible] the producer's profits, we must assume that [illegible] producers felt [illegible] actions were necessary for economic [illegible]. The question [illegible] pesticide use be reduced. We strongly feel that the answer is yes, [illegible] a cost. First, insecticides can be evaluated and residue studi[illegible] small acreages (plots of less than 0.1 acre are common) and [illegible] are registered they usually have applications [illegible] many crop[illegible]. Secondly, biologically-based technologies require much larger acre[illegible] test plots are not uncommon) and they [illegible] crop specific. The development of alternatives [illegible] methods will clearly require a major commitment to this type research. [illegible] Also, over the years the general public has [illegible] increasing[illegible] to produce and market crops that are totally free of insect[illegible] and free of any blemishes or aberrations of any kind. [illegible] particularly for fruits and vegetables have often been based on [illegible] consumer acceptance. This has encouraged increased [illegible] upon pesticides. We hope that consumers will understand that [illegible] of minor blemishes on fresh market commodities will allow reduced [illegible] cides, without sacrificing nutritional quality or wholesomeness. [illegible] organically-grown produce or produce grown without use [illegible] can be expected to have minor imperfections [illegible]

[illegible]ly, more attention must be given to very large-scale area-wide [illegible] to validate and demonstrate new pest management strategies. [illegible] be on prevention of pest population buildup, rather than [illegible] levels. Farmers will not necessarily adopt some of the new [illegible] are confident they will work and be profitable

AGRICULTURAL RESEARCH SERVICE
SUMMARY OF
PESTICIDE RELATED PROGRAMS
FY 1993

PROGRAM	FY 1993 BUDGET
Minor Use Pesticides, IR-4	$2,142,000
IPM	11,053,000
Biocontrol	44,334,000
NAPIAP	860,000
Other Pesticide Related Research	52,559,000
TOTAL Pesticide Related Programs	$110,948,000

Pesticide related programs as they relate to non-chemical\chemical pest control.

Non-chemical pest control	$88,374,000
Chemical pest control	22,574,000
TOTAL Non-chemical/Chemical	$110,948,000

Other related activities:

Sustainable Agriculture	$165,647,000
Fruit fly Research	$9,448,000
Alternatives to Methyl Bromide	$8,264,000

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service

Minor Use Pesticides

Location	FY 1992 Estimated	FY 1993 Estimated	FY 1994 Estimated
CA, Salinas	$141,600	$141,900	$141,900
DC, Arboretum	30,800	31,000	31,000
GA, Tifton	626,000	649,400	649,400
IL, Urbana	10,300	10,300	10,300
MD, Beltsville	312,500	343,200	343,200
MD, Frederick	47,400	47,600	47,600
MS, Poplarville	11,400	11,400	11,400
OH, Wooster	72,400	72,400	72,400
OR, Corvallis	62,000	62,300	62,300
SC, Charleston	51,500	51,800	51,800
TX, Weslaco	113,000	113,400	113,400
WA, Prosser	89,900	90,100	90,100
WA, Yakima	443,300	452,900	452,900
NPS (To be determined)	120,800	64,200	64,200
TOTAL, Minor Use Pesticides	2,133,000	2,141,900	2,141,900

Mr. DURBIN. Please describe for the Committee the IR-4 program and the ARS role under that program.

Dr. PLOWMAN. The IR-4 program is a cooperative program among Federal, State, and Industry scientists to register minor uses of pesticides. The major research component to develop performance and residue data is the joint responsibility of USDA-ARS, USDA-CSRS, the State agricultural experiment stations, and private industry. A staff headquartered at Rutgers University maintains files, tracks projects, prepares research protocols, and develops petitions for submittal to regulatory agencies and the chemical registrants. The program is guided by an Administrative Advisory Committee and a Technical Committee. I represent ARS on the Advisory Committee and one of our scientists is Chairman of the Technical Committee. In addition, the ARS role is to conduct field experiments for performance and residue data and labortories to perform the residue analysis.

Mr. DURBIN. How are IR-4 projects selected?

Dr. PLOWMAN. Minor use needs are identified by growers, researchers and extension specialists. The researchable needs are prioritized at National IR-4 workshops. Annual selection of tentative projects are made at regional meetings by the IR-4 state and ARS liaison representatives. These selections are based in part on the priorities established by workshops and by regional and national needs. Final selection of projects is coordinated with the States and ARS and with the field and chemical residue studies at a national meeting each year. Availability of scientific expertise and resources to conduct the studies are the final determining factors in project selection.

IR-4 Research

Mr. DURBIN. By location, what is the funding and staff for IR-4 research for fiscal years 1992, 1993, and 1994?

Dr. PLOWMAN. Levels of ARS funding and staff for IR-4 research for fiscal years 1992, 1993, and 1994 are shown in the following table:

	FY 1992		FY 1993		FY 1994	
Location	Funds	Scientists	Funds	Scientists	Funds	Scientists
Salinas, CA	$141,700	1.1	$141,900	1.1	$141,900	1.1
Washington, DC	30,800	0.0	31,000	0.0	31,000	0.0
Tifton, GA	626,000	2.6	649,400	2.6	649,400	2.6
Urbana, IL	10,300	0.0	10,300	0.0	10,300	0.0
Beltsville, MD	312,500	1.6	343,200	1.6	343,200	1.6
Frederick, MD	47,400	0.1	47,600	0.1	47,600	0.1
Poplarville, MS	11,400	0.0	11,400	0.0	11,400	0.0
Wooster, OH	72,400	1.0	72,400	1.0	72,400	1.0
Corvallis, OR	62,000	0.5	62,300	0.5	62,300	0.5
Charleston, SC	51,500	0.2	51,800	0.2	51,800	0.2
Weslaco, TX	113,000	1.1	113,400	1.1	113,400	1.1
Prosser, WA	89,900	1.2	90,100	1.2	90,100	1.2
Yakima, WA	443,300	2.2	452,900	2.2	452,900	2.2
Held by HDQRS	120,800	0.1	64,200	0.1	64,200	0.1
Total	$2,133,000	11.7	$2,141,900	11.7	$2,141,900	11.7

Mr. DURBIN. What is the total USDA budget for IR-4 for fiscal years 1992, 1993, and 1994, by agency and by program?

Dr. PLOWMAN. The total USDA funding for IR-4 research for fiscal years 1992, 1993 and 1994 is as follows:

Agency	FY 1992	FY 1993	FY 1994
ARS	$2,133,100	$2,141,900	$ 2,141,900
CSRS	4,420,000	4,446,000	11,145,000
Total	$6,553,100	$6,587,900	$13,286,900

AGRICULTURAL RESEARCH SERVICE
INTEGRATED PEST MANAGEMENT RESEARCH

LOCATION	NET TO LOCATION	FY 1993 APPROPRIATED
AR, Stuttgart	$32,699	$36,269
AZ, Phoenix	20,120	22,317
CA, Albany	81,303	90,180
CA, Brawley	75,574	83,826
CA, Fresno	375,426	416,610
CA, Salinas	12,300	13,666
CA, Shafter	74,038	82,122
FL, Canal Point	52,996	58,783
FL, Fort Lauderdale	252,502	280,072
FL, Gainesville	1,234,380	1,369,161
FL, Miami	377,830	419,085
GA, Byron	111,881	124,097
GA, Dawson	40,000	44,444
GA, Tifton	623,766	691,875
IA, Ames/Ankeny	104,830	116,310
IN, West Lafayette	150,000	166,667
KS, Manhattan	721,279	799,980
LA, Houma	141,216	156,634
MD, Beltsville	615,593	682,809
MO, Columbia	81,404	90,292
MS, Mississippi State	112,396	124,813
MS, Stoneville	1,235,147	1,370,013
NC, Raleigh	43,689	48,459
NE, Lincoln	381,063	422,671
NY, Ithaca	204,478	226,805
SC, Charleston	315,351	349,784
TX, College Station	290,764	322,609
TX, Kerrville	110,820	122,919
TX, Weslaco	878,390	974,573
WA, Pullman	193,028	214,105
WA, Yakima	916,964	1,017,086
Headquarters, NPS	102,239	113,599
	---------	---------
TOTAL Integrated Pest Management	$9,963,466	$11,052,635

RECOMMENDED ALLOCATION OF INTEGRATED PEST MANAGEMENT FUNDS FOR FY-1993 AND BEYOND

Project Number/Title	Location and Lead Scientist	Net to Location FY-1993	FY-1994	FY-1995	FY-1996
		---$---	---$---	---$---	---$---
WR-IPM-84-5 An integrated pest management system for crop production in the Northwest wheat region (0500-00002-~~013~~) 029	Pullman, WA F. L. Young	100.00	75.00(E)	--	--
IPM-90-1 Model-based reasoning system for cotton pest management (0500-00002-009)	Mississippi State, MS T. Wagner	75.00	--	--	--
IPM-90-4 Effect of postharvest calcium treatment of apples on storage decay and quality (0500-00002-012)	Beltsville, MD W. Conway	50.00(E)	--	--	--
IPM-92-1 Lettuce infectious yellows control in the Desert Southwest (0500-00002-016)	Salinas, CA J. Duffas	82.00	84.00	--	--
IPM-92-2 Integration of agronomic and pest management strategies to increase efficiency and reduce chemical usage in cotton (0500-00002-015)	Weslaco, TX L. Namken	142.50	142.50	--	--
IPM-92-3 Biological Control of Stored Product Insects (0500-00002-018) (115,500) 72,235) (73,270) (0500-00002-020) (97,400) (68,135) (85,470) (0500-00002-021) (137,100) (79,630) (71,260)	Savannah, GA R. Arbogast Manhattan, KS W. McGaughey Beaumont, TX R. Cogburn	220.00	230.00	--	--

11

RECOMMENDED ALLOCATION OF INTEGRATED PEST MANAGEMENT FUNDS FOR FY-1993 AND BEYOND

Project Number/Title	Location and Lead Scientist	Net to Location FY-1993			
		FY-1993 ---$---	FY-1994 ---$---	FY-1995 ---$---	FY-1996 ---$---
IPM-92-4 Sex pheromone of the Mexican rice borer as a mating disruptant in the sugar cane (0500-00002-019)	College Station, TX T. Shaver	50.00	50.00	--	--
IPM-92-5 Biological control of the boll weevil and whitefly in cotton with a biorational (Beauvaria bassiana) (0500-00002-022) ($70,000) (0500-00002-023) ($30,000)	Weslaco, TX J. Wright R. Carruthers	100.00	100.00	--	--
IPM-93-1 Sweetpotato whitefly population suppression in upland and long-staple cotton: Decision-making and application tools for short-season crop management (0500-00002-017)	Phoenix, AZ H. Flint	165.00	240.00	--	--
IPM-93-2 Development of an Integrated program using trichogramma maidis and Bacillus thurigeneis for suppression of European corn borer (0500-00002-024)	Ankeny, IA L. Lewis	71.00	71.00	71.00	--
IPM-93-3 Evaluation of Archytas marmoratus when released innundatively in whorl stage corn (0500-00002-025)	Tifton, GA H. Gross	100.00	100.00	100.00	--

RECOMMENDED ALLOCATION OF INTEGRATED PEST MANAGEMENT FUNDS FOR FY-1993 AND BEYOND

Project Number/Title	Location and Lead Scientist	Net to Location FY-1993	FY-1994	FY-1995	FY-1996
		---$---	---$---	---$---	---$---
IPM-93-4 Integrated pest management of citrus: Role of Gibberellic acid in promoting resistance of grapefruit to the Caribbean fruit fly (0500-00002-028)	Gainesville, FL P. Greany	88.00	88.00	88.00	--
IPM-93-5 Integration and alternative treatments for control of postharvest insect pests of dried fruits and tree nuts (0500-00002-026)	Fresno, CA P. Vail	100.00	100.00	100.00	--
IPM-93-6 Integrated biological and chemical control of postharvest decay of pome fruits (0500-00002-027)	Wenatchee, WA R. G. Roberts	68.00	68.00	68.00	--
IPM-94-1 Plant Growth Regulators and the IPM of the Sweetpotato Whitefly: Host Manipulation and Habitat Improvement for Natural Enemies (0500-00002-???)	Orlando, FL W. Schroeder	--	40.00	40.00	40.00
IPM-94-2 Integration of Mating Disruption and Parasitoids to Control Diamondback Moth in Cruciferous Vegetables (0500-00002-???	Gainesville, FL E. Mitchell	--	85.00	100.00	100.00

RECOMMENDED ALLOCATION OF INTEGRATED PEST MANAGEMENT FUNDS FOR FY-1993 AND BEYOND

Project Number/Title	Location and Lead Scientist	Net to Location FY-1993	FY-1994	FY-1995	FY-1996
		---$---	---$---	---$---	---$---
IPM-94-3 Determination and Evaluation of the Effects of Migratory Activity on Population Dynamics of Corn Earworm and Its Relationship to the Development of Pest Management Strategies (0500-00002-???)	College Station, TX J. Westbrook	--	100.00	175.00	175.00
	Available:	1,156,678	1,415,678	1,738,700	?
	Committed:	1,411,500	1,573,500	742,000	315,000
	Balance:	-254,822	-157,822	996,700	
	(From PT)	259,300	165,200		
	Overall Balance	-4,478	7,379		
	To Project 92-4	-4,478			
	Final Balance	-0-			

RECOMMENDED ALLOCATION OF PILOT TEST FUNDS (x 1,000) FOR FY-1993 AND BEYOND

Project Number/Title	Location and Lead Scientist(s)	Net to Location FY-1993	FY-1994	FY-1995	FY-1996
		---$---	---$---	---$---	---$---
PT-89-10 Biosystematic information transfer systems fruit fly prototype (0500-00001-~~010~~) 049	Beltsville, MD F. Thompson	66.00(E)	--	--	--
PT-90-1 Selective chemical suppression of feral Africanized honey bees	Baton Rouge, LA T. Rinderer	32.00(E)	--	--	--
PT-90-2 Biocontrol of the Caribbean fruit fly (0500-00001-018)	Gainesville, FL J. Sivinski	15.00	--	--	--
PT-91-1 Integrate parasitoid augmentation & sterile fly releases for suppression of oriental fruit fly and melon fly populations (0500-00001-029)	Honolulu, HI M. Purcell	155.70	160.00	--	--
PT-91-2 Expert system for management of insect pests of stored grain (0500-00001-026)	Manhattan, KS P. Flinn	86.00	--	--	--
PT-91-3 Expert systems for peanuts (0500-00001-028)	Dawson, GA J. Davidson	40.00	--	--	--
PT-91-4 Application of mycorrhizal fungi & biocontrol agents to control root diseases of horticultural crops (0500-00001-027) ($40,000) (0500-00001-030) ($40,000)	Corvallis, OR R. Linderman Orlando, FL Stan Nemec	80.00	--	--	--

RECOMMENDED ALLOCATION OF PILOT TEST FUNDS (x 1,000) FOR FY-1993 AND BEYOND

Project Number/Title	Location and Lead Scientist(s)	Net to Location FY-1993	FY-1994	FY-1995	FY-1996
		---$---	---$---	---$---	---$---
PT-91-5 Development of entomopathogenic nematodes as biological insecticides of white grubs in turf (0500-00001-025)	Wooster, OH M. Klein	60.50	--	--	--
PT-92-4 Biological control of the ring nematode, *Criconemella xenoplax* (0500-00001-032)	Byron, GA A. Nyczepir	26.00	27.00	--	--
PT-92-6 Suppression of boll weevils with bait sticks (0500-00001-031)	Mississippi State, MS J. Smith	50.00	50.00	--	--
PT-92-8 Automation of stored-grain insect population monitoring with acoustics (0500-00001-044)	Manhattan, KS D. Hagstrum	55.00	55.00	--	--
PT-92-10 Pilot testing of a novel biocontrol formulation against damping-off diseases of high-value vegetable crops (0500-00001-046)	Beltsville, MD J. Lewis	55.00	55.00	--	--
PT-92-12 Area-wide management of *Heliothis virescens* through genetic sterilization and release (0500-00001-033)	Stoneville, MS M. Laster	285.00	24.00	--	--

RECOMMENDED ALLOCATION OF PILOT TEST FUNDS (x 1,000) FOR FY-1993 AND BEYOND

Project Number/Title	Location and Lead Scientist(s)	Net to Location FY-1993	FY-1994	FY-1995	FY-1996
		---$---	---$---	---$---	---$---
PT-93-1 Management of gypsy moth in nonforest environs using improved virus formulations (0500-00001-051)	Beltsville, MD R. E. Webb/R. L. Ridgway	100.00	100.00	100.00	--
PT-93-2 Pilot test of WHIMS--An expert system of cotton pest management (0500-00001-050)	Mississippi State, MS T. L. Wagner	85.00	85.00	85.00	--
PT-93-3 Biological control of fire blight of apples and pears (0500-00001-052)	Corvallis, OR J. Loper/V. Stockwell	70.00	70.00	70.00	--
PT-93-4 Accelerating the deployment of _Aphthona_ spp. for biological control of leafy spurge (0500-00001-045)	Bozeman, MT P. C. Quimby	59.00	59.00	59.00	--
IPM-93-5 Control of Heliothis/Helicoverpa complex in cotton with semiochemicals (0500-00001-048)	Gainesville, FL E. R. Mitchell	100.00	100.00	100.00	--
PT-94-1 Using Queen Development Time to Prevent the Africanization of European Honey Bees and to Certify Commercial Honey Bee Stocks (0500-00001-???	Tucson, AZ E. Erickson	--	55.00	60.00	60.00

RECOMMENDED ALLOCATION OF PILOT TEST FUNDS (x 1,000) FOR FY-1993 AND BEYOND

Project Number/Title	Location and Lead Scientist(s)	Net to Location FY-1993	FY-1994	FY-1995	FY-1996
		---$---	---$---	---$---	---$---
PT-94-2 Suppression of Colorado Potato Beetle Infestation of Potato Fields by Augmenting the Population of the Predatory Spinded Soldier Bug, <u>Podisus Maculiventris</u> (0500-00001-???)	Beltsville, MD J. Aldrich	--	60.00	60.00	60.00
PT-94-3 Development of New Dispenser Designs for Attractants of Oriental, Malaysian, and Melon Fruit Flies for Use in Detection Traps (0500-00001-???)	Beltsville, MD B. Leonhardt	--	50.00	60.00	60.00
PT-94-4 Pilot Test of Satellite-Transgenic Tomato Resistance Against Cucumber Mosaic Virsu: A Novel Biocontrol Strategy (0500-00001-???)	Beltsville, MD J. Kaper	--	80.00	80.00	80.00
PT-94-5 Suppression of Boll Weevil Infestations by Inoculative/ Augmentative Releases of <u>Catolaccus grandis</u> (0500-00001-???)	Weslaco, TX E. King	--	75.00	175.00	175.00

RECOMMENDED ALLOCATION OF PILOT TEST FUNDS (x 1,000) FOR FY-1993 AND BEYOND

Project Number/Title	Location and Lead Scientist(s)	Net to Location FY-1993	FY-1994	FY-1995	FY-1996
		---$---	---$---	---$---	---$---
PT-94-6 Suppression of Corn Earworm, Fall Armyworm and Pink Bollworm with the Parasitic Nematodes, _Steinernema riobravis_ and _Steinernema carpocapsae_ (0500-00001-???	Weslaco, TX J. Raulston	--	150.00	225.00	225.00
	Available:	1,679,500	1,420,200	1,255,000	?
	Committed:	1,420,200	1,255,000	1,074,000	660,000
	Balance:	259,300	165,200	181,000	
	$ to IPM	-259,300	-165,200		
	Final Balance	- 0 -	- 0 -		
Overall IPM/PT Funds					
	Available:			2,836,178	2,836,178
	Committed:			1,816,000	1,290,000
	Balance:			1,020,000	1,546,178

Mr. Specter:

Mr. Secretary, Integrated Pest Management (IPM) has enabled growers in Pennsylvania to raise crops in an economical and environmentally sound manner. USDA officials have asserted that thirteen different USDA agencies are working on IPM.

S-6 QUESTION: Given the importance of IPM programs to agriculture, what can the Department do to coordinate IPM activities and make them a priority?

ANSWER: The Department has established the IPM Working Group to build increased communication and coordination between the thirteen agencies having such programs plus participation from the Environmental Protection Agency's Office of Pesticide Programs. One working group activity has been assembling information on the various IPM projects in a brochure which will be published in mid-May. Increased information exchange between agencies will lead to greater coordination in program implementation that is necessary to encourage IPM use by food and fiber producers. The Department co-sponsored with EPA the National IPM Forum in 1992 that identified constraints and suggested solutions to barriers that limit IPM adoption by farmers. The IPM Working Group is one initiative among several others that is responding to the Forum's call for action.

AGRICULTURAL RESEARCH SERVICE
BIOCONTROL RESEARCH

LOCATION	NET TO LOCATION	FY 1993 APPROPRIATED
AZ, Phoenix	1,525,100	1,691,935
CA, Albany	854,504	947,805
CA, Davis	67,397	74,756
CA, Fresno	532,747	590,917
DC, Washington (Arboretum)	51,881	57,546
DE, Newark	609,666	676,235
FL, Fort Lauderdale	252,502	280,072
FL, Gainesville	2,626,551	2,913,373
FL, Miami	134,693	149,400
FL, Orlando	456,330	506,195
GA, Athens	134,354	149,024
GA, Byron	223,760	248,192
GA, Savannah	946,933	1,050,467
GA, Tifton	1,078,839	1,196,825
HI, Honolulu	768,700	852,931
IA, Ames/Ankeny	465,617	516,593
IL, Peoria	1,570,572	1,742,060
IL, Urbana	86,774	96,250
IN, West Lafayette	131,629	146,001
KS, Manhattan	420,745	466,872
LA, Houma	176,520	195,794
LA, New Orleans	285,838	317,048
MD, Beltsville	6,641,850	7,367,265
MD, Frederick	723,731	802,754
ME, Orono	67,500	74,870
MO, Columbia	1,269,645	1,408,275
MS, Stoneville	2,193,697	2,433,227
MT, Bozeman	824,179	914,282
MT, Sidney	178,313	197,783
NC, Oxford	522,214	579,235
ND, Fargo	1,350,973	1,498,489
NY, Ithaca	1,050,812	1,165,548
OH, Wooster	192,182	213,283
OK, Lane	21,052	23,350
OK, Stillwater	832,289	923,165
OR, Corvallis	138,728	153,876
PA, University Park	165,703	183,796
SC, Charleston	646,906	717,540
SD, Brookings	561,724	623,108
TX, Beaumont	289,588	321,362
TX, College Station	522,385	579,424
TX, Temple	337,033	373,833
TX, Weslaco	2,321,644	2,575,331
WA, Pullman	605,448	671,556
WA, Wanatchee	189,641	210,413
WA, Yakima	1,201,031	1,332,168
WI, Madison	544,549	604,008
WY, Laramie	50,163	55,640
WV, Kearneysville	735,648	815,972
Headquarters, NPS	100,000	111,108
Argentina, Buenos Aires	279,385	309,890
France, Montpellier	1,826,819	2,026,283
Korea, Seoul	180,818	200,561
	---------	---------
TOTAL Biocontrol Research	$39,967,302	$44,333,686

Date: February 22, 1993
Contact Person: James L. Krysan
Telephone: 301-504-5930

Issue Briefing Paper - FY 1994

1. Subject: Biological Control Research in ARS - Overall Support

2. Nature and Background of Issue:

- o Biological control is a viable, environmentally-compatible approach for control of certain weeds, insects, mites, plant diseases, and nematodes using parasites, pathogens and predators.

- o It is a proven, practical, and cost-effective method of pest management that is compatible with conventional agriculture, essential to sustainable agriculture, and useful in natural and managed ecosystems, including forests, aquatic habitats, rangeland, and urban environments.

- o The goal of biological control is not to eradicate pests, but rather to reduce damage or nuisance activities to economical or tolerable levels without harm to the environment.

- o ARS has redirected scientific staff to biological control at this time when the public is demanding a major reduction in use of chemical pesticides.

3. ARS Position and Recommended Action:

- o Biological control research is a high priority within ARS, and is envisioned as the desired cornerstone of integrated pest management for the future.

- o As a part of the Interagency Biological Control Coordinating Committee (IBC3) (including ARS, APHIS, FS, ES, and CSRS), ARS is supportive of increased base funding for biological control research.

4. Funding: FY 1993 - $44,334,000

Major research programs include biological control of rangeland weeds, aquatic weeds, plant pathogens, and insects. These are located in Arizona, Arkansas, California, Florida, Georgia, Hawaii, Illinois, Iowa, Kansas, Maryland, Mississippi, Missouri, Montana, Nebraska, New Jersey, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Texas, West Virginia, Washington, and Wisconsin.

AGRICULTURAL RESEARCH SERVICE
NON-CHEMICAL PEST CONTROL

LOCATION	NET TO LOCATION	FY 1993 APPROPRIATED
AR, Booneville	$202,256	$224,341
AR, Stuttgart	48,086	53,336
AZ, Phoenix	1,726,307	1,915,115
CA, Albany	885,241	981,900
CA, Brawley	45,344	50,295
CA, Davis	488,772	542,142
CA, Fresno	1,707,895	1,894,572
CA, Salinas	1,358,446	1,506,913
CA, Shafter	120,434	133,584
CO, Fort Collins	112,500	124,784
DC, Washington (Arboretum)	20,366	22,589
DE, Newark	609,666	676,235
FL, Canal Point	190,284	211,061
FL, Fort Lauderdale	459,903	510,119
FL, Gainesville	5,961,962	6,613,166
FL, Miami	201,841	223,880
FL, Orlando	1,035,178	1,148,207
GA, Byron	983,955	1,091,441
GA, Dawson	37,642	41,764
GA, Savannah	1,749,448	1,940,607
GA, Tifton	2,390,102	2,651,270
HI, Honolulu	5,246,650	5,819,819
IA, Ames/Ankeny	696,527	772,580
ID, Aberdeen	35,111	38,945
IL, Peoria	550,016	610,072
IL, Urbana	254,811	282,634
IN, West Lafayette	1,458,144	1,617,357
KS, Manhattan	745,782	827,345
LA, Houma	500,636	555,299
LA, New Orleans	380,683	422,249
MD, Beltsville	12,760,153	14,154,027
MD, Frederick	1,724,086	1,912,339
ME, Orono	67,500	74,870
MI, East Lansing	130,723	144,997
MN, St. Paul	1,203,397	1,334,794
MO, Columbia	1,173,727	1,301,885
MS, Mississippi State	2,973,107	3,297,815
MS, Poplarville	125,195	138,864
MS, Stoneville	3,657,465	4,057,513
MT, Bozeman	975,681	1,082,214
NC, Oxford	637,892	707,543
NC, Raleigh	205,735	228,199
ND, Fargo	2,869,829	3,183,184
NE, Lincoln	628,146	696,733
NJ, Chatsworth	511,021	566,819
NV, Reno	483,312	536,085
NY, Ithaca	565,582	627,338
OH, Wooster	260,613	289,185
OK, El Reno	112,978	125,314
OK, Lane	42,104	46,701

OK, Stillwater	800,033	887,387
OR, Corvallis	1,125,795	1,248,904
SC, Charleston	2,151,418	2,386,327
SC, Florence	170,519	189,138
SD, Brookings	430,524	477,533
TN, Jackson	164,711	182,696
TX, Beaumont	219,181	243,267
TX, Brownwood	114,984	127,539
TX, College Station	1,312,291	1,455,666
TX, Kerrville	1,628,367	1,806,166
TX, Temple	337,033	373,833
TX, Weslaco	2,267,340	2,515,061
UT, Logan	167,631	185,935
WA, Prosser	1,293,997	1,435,303
WA, Pullman	994,612	1,103,213
WA, Yakima	1,811,959	2,009,815
WI, Madison	445,023	493,617
WV, Kearneysville	99,037	109,851
Headquarters, NPS	31,000	34,444
Argentina, Buenos Aires	279,385	309,891
France, Montpellier	1,644,139	1,823,657
Korea, Seoul	180,818	200,561
Mexico, Tuxtla Gutierrez	688,909	764,132
	---------	--------
TOTOL Non-Chemical Pest Control	$79,670,940	$88,373,976

AGRICULTURAL RESEARCH SERVICE
CHEMICAL PEST CONTROL

LOCATION	NET TO LOCATION	FY 1993 APPROPRIATED
AR, Stuttgart	$10,899	$12,089
AZ, Tucson	234,402	259,996
CA, Brawley	30,229	33,530
CA, Davis	29,231	32,423
CA, Fresno	205,366	227,791
CA, Riverside	467,788	518,864
CA, Salinas	127,683	141,870
CA, Shafter	74,038	82,122
CO, Akron	233,533	259,033
CO, Fort Collins	83,251	92,341
DC, Washington (Arboretum)	27,864	30,960
FL, Fort Lauderdale	41,480	46,009
FL, Gainesville	612,116	678,953
FL, Miami	555,589	616,253
GA, Dawson	112,926	125,290
GA, Savannah	1,516,342	1,681,911
GA, Tifton	1,119,501	1,242,809
HI, Honolulu	194,000	215,181
IA, Ames/Ankeny	981,972	1,089,193
IL, Urbana	177,431	196,806
IN, West Lafayette	207,398	230,332
KS, Manhattan	57,833	64,148
LA, Baton Rouge	253,324	280,984
LA, Houma	70,608	78,317
LA, New Orleans	556,147	616,871
MD, Beltsville	3,230,180	3,585,936
MD, Frederick	42,878	47,642
MN, St. Paul	170,276	188,869
MS, Oxford	236,388	262,199
MS, Mississippi State	489,553	543,097
MS, Poplarville	10,286	11,429
MS, Stoneville	2,274,673	2,523,331
NC, Oxford	108,262	120,084
NC, Raleigh	43,689	48,459
ND, Fargo	405,156	449,394
NE, Lincoln	69,087	76,630
NY, Ithaca	52,544	58,282
OH, Wooster	799,951	887,360
OR, Corvallis	104,956	116,416
TX, Beaumont	57,619	63,911
TX, College Station	1,655,184	1,835,921
TX, Kerrville	592,578	657,280
TX, Weslaco	399,950	443,817
UT, Logan	26,820	29,749
WA, Prosser	288,232	319,735
WA, Pullman	61,232	67,918
WA, Yakima	753,119	836,119
WV, Kearneysville	82,740	91,775
Headquarters, NPS	336,815	374,238
Mexico, Tuxtla Gutierrez	72,591	80,518
	--------	--------
TOTOL Chemical Pest Control	$20,345,710	$22,574,185

AGRICULTURAL RESEARCH SERVICE
SUSTAINABLE AGRICULTURE

LOCATION	NET TO LOCATION	FY 1993 APPROPRIATED
AL, AUBURN	1,126,981	1,251,515
AR, BOONEVILLE	1,336,709	1,484,418
AZ, PHOENIX	1,942,647	2,157,314
AZ, TUCSON	806,433	895,546
CA, ALBANY	220,295	244,638
CA, FRESNO	993,213	1,102,965
CA, SALINAS	527,129	585,378
CA, SHAFTER	123,513	137,161
CO, AKRON	1,226,511	1,362,043
CO, FT. COLLINS	1,233,539	1,369,908
DC, WASHINGTON (NATIONAL ARBORETUM)	1,786,857	1,984,309
DE, NEWARK	301,019	334,282
FL, BROOKSVILLE	726,491	806,770
FL, CANAL POINT	132,492	147,133
FL, FT. LAUDERDALE	252,502	280,404
FL, GAINESVILLE	3,441,617	3,821,994
FL, ORLANDO	930,346	1,033,175
FR, MONTPELLIER	264,785	294,044
GA, ATHENS	1,294,170	1,437,179
GA, BYRON	2,135,920	2,371,960
GA, GRIFFIN	290,152	322,214
GA, SAVANNAH	72,235	80,261
GA, TIFTON	3,890,599	4,320,579
GA, WATKINSVILLE	1,023,594	1,136,703
HEADQUARTERS, NPS	784,600	871,778
HI, HONOLULU	1,916,649	2,128,444
IA, AMES/ANKENY	2,589,796	2,876,018
ID, ABERDEEN	1,257,461	1,396,662
ID, AMES (NADC)	8,750,675	9,717,645
ID, DUBOIS	1,374,871	1,526,797
ID, KIMBERLY	1,832,766	2,035,291
IL, PEORIA	1,350,414	1,499,637
IL, URBANA	258,519	287,086
IN, WEST LAFAYETTE	1,501,531	1,667,454
KS, MANHATTAN	425,360	472,405
KY, LEXINGTON	239,300	265,743
LA, BATON ROUGE	1,006,844	1,118,103
LA, HOUMA	359,420	399,137
LA, NEW ORLEANS	406,259	451,152
MD, BELTSVILLE (LPSI)	6,008,791	6,672,775
MD, BELTSVILLE (NRI)	1,377,461	1,529,673
MD, BELTSVILLE (PSI)	12,083,571	13,418,927
MD, FREDERICK	486,449	540,203
ME, ORONO	857,917	952,719
MI, EAST LANSING	713,694	792,559
MN, ST. PAUL	1,360,151	1,510,588
MO, COLUMBIA	1,544,354	1,715,009
MS, MISSISSIPPI STATE	3,023,594	3,357,706
MS, POPLARVILLE	231,785	257,398
MS, STONEVILLE	4,466,309	4,960,020

MT, BOZEMAN	1,164,724	1,293,465
MT, MILES CITY	1,326,147	1,472,689
MT, SIDNEY	681,489	756,795
MX, TUXLA GUTIERREZ	400,598	444,865
NATURAL RESOURCES/SYSTEMS	1,441,580	1,601,755
NC, RALEIGH	825,415	916,625
ND, FARGO	658,945	731,759
ND, MANDAN	1,634,933	1,815,597
NE, CLAY CENTER	7,453,683	8,277,332
NE, LINCOLN	1,803,327	2,002,689
NJ, CHATSWORTH	511,021	567,490
NV, RENO	483,313	536,720
NY, GENEVA	242,690	269,508
NY, ITHACA	1,278,085	1,419,317
NY, PLUM ISLAND	2,616,922	2,906,098
OH, COSHOCTON	627,692	697,053
OH, WOOSTER	279,973	310,947
OK, DURANT	394,696	438,372
OK, EL RENO	1,298,126	1,441,572
OK, LANE	872,035	968,397
OK, STILLWATER	1,492,066	1,656,943
OK, WOODWARD	1,251,655	1,389,965
OR, BURNS	490,539	544,745
OR, CORVALLIS	1,223,924	1,359,238
OR, PENDLETON	790,957	878,360
PA, UNIVERSITY PARK	1,064,491	1,182,181
PR, MAYAGUEZ	722,680	802,538
SC, CHARLESTON	1,926,457	2,139,335
SC, FLORENCE	768,857	853,818
SD, BROOKINGS	1,273,685	1,414,506
TN, LEWISBURG	144,074	159,995
TX, BEAUMONT	284,462	315,944
TX, BROWNWOOD	467,161	518,783
TX, BUSHLAND	898,016	997,249
TX, COLLEGE STATION	1,928,077	2,141,164
TX, KERRVILLE	1,836,689	2,039,647
TX, TEMPLE	931,716	1,034,672
TX, WESLACO	2,347,215	2,606,717
UT, LOGAN	1,622,867	1,802,198
VA, SUFFOLK	658,625	731,404
WA, PROSSER	1,225,442	1,360,856
WA, PULLMAN	3,228,136	3,584,853
WA, YAKIMA	647,525	719,078
WI, MADISON	1,344,945	1,493,565
WV, KEARNEYSVILLE	2,636,323	2,927,942
WY, CHEYENNE	593,372	658,941
WY, LARAMIE	1,394,896	1,549,035
UNIDENTIFIED	9,109,464	8,531,461
	----------	----------
TOTAL SUSTAINABLE AGRICULTURE	150,588,000	165,647,000

Low-Input Sustainable Agriculture

Mr. DURBIN. Would you please describe for the Committee in detail the work ARS has underway in the field of low-input sustainable agriculture.

Dr. PLOWMAN. ARS research on sustainable agriculture is broad based and encompasses about 20 percent of our programs. These projects that contribute to sustainable agriculture relate to one or more of the following criteria: integrated system of plant and animal production practices, satisfy human food and fiber needs, enhance environmental quality, natural resource conservation and enhancement, biological resource utilization, economic viability, and quality of life. Specific examples of ARS research related to sustainable agriculture in FY 1993 include:

-- the development of economically efficient and sustainable forage and livestock production systems for hill-land small farms

-- the development and assessment of agroforestry systems for family farms that are compatible with combined livestock, tree, pasture, and wildlife production

-- the development of new technology or knowledge to minimize production constraints of horticultural crops for small farms

-- the determination of the effects of conservation tillage and reduced weed management on weeds, insects, diseases, crop yields, and soil quality in a 3-year cereal legume rotation

-- the evaluation of insect pathogens and arthropods attacking selected insect and weed pests of solanaceous vegetables, cole crops, and sweet corn in the Mid-Atlantic region

-- the evaluation of modern cultural practices (including conservation tillage, soil mulches, and plant covers) on the productivity of vegetable cultivars

Mr. DURBIN. Where is this work carried out?

Dr. PLOWMAN. The first three of the examples given represent projects at Booneville, Arkansas. The fourth is an integrated pest management project at Pullman, Washington. The last two are projects from Beltsville, Maryland.

Mr. DURBIN. What is the budget for fiscal years 1992, 1993, and 1994?

Dr. PLOWMAN. We reported earlier that about $120 million of ARS programs could be considered as contributing to sustainability in fiscal year 1992. For fiscal years 1993 and 1994, the estimates are $120 million and $121.6 million, respectively. However, we have recently reviewed new criteria, in conjunction with CSRS, for classifying sustainable agriculture research, as defined in the 1990 Farm Bill and have convened panels to reassess the contribution of individual research projects to sustainability. These panels include university scientists, representatives from industry, farmers,

representatives from non-profit organizations, as well as USDA scientists. Upon completion, a new estimate of the contribution of ARS to sustainability can be provided. To date, 3 such panels have rated 691 projects out of a total of 1,500+ ARS projects. Based on the results from these panels, projects totalling $68 million out of $232 million evaluated were judged to contribute significantly to sustainability, or 29 percent of the funds represented by those projects. The process of evaluating all ARS programs will be completed in April 1993.

Mr. DURBIN. What is the total USDA program, by agency, for low-input sustainable agriculture for fiscal years 1992, 1993, and 1994?

Dr. PLOWMAN. The total USDA funding for low-input sustainable agriculture by agency and fiscal year is as follows:

Sustainable Agriculture
(Dollars in Thousands)

	FY 1992	FY 1993	FY 1994
Agricultural Research Service	$120,000	$120,000	$121,600
Cooperative State Research Service	90,459	90,559	91,952
Extension Service	37,600	37,600	37,600
Economic Research Service	~~287~~ 215	~~287~~ 215	~~287~~ 215
	$248,~~346~~ 274	$248,~~446~~ 374	~~$251,439~~ 251,367

AGRICULTURAL RESEARCH SERVICE
FRUIT FLY RESEARCH

LOCATION	FY 1993 APPROPRIATED
CA, Albany	$56,800
CA, Fresno	151,100
FL, Gainesville	882,700
FL, Miami	478,500
FL, Orlando	409,300
HI, Honolulu	5,684,500 1/
MD, Beltsville	306,000
TX, Weslaco	1,478,900
TOTAL ARS Fruit Fly Research	$9,447,800

1/ In FY 1993 $3,064,000 was specifically allocated for fruit fly eradication research.

Breakdown of the above funding by fruit fly:

LOCATION	Caribbean 4506	Malaysian 4507	Mediterranean 4508	Melon 4509	Mexican 4510	Oriental 4511	Papaya 4512	Other 4514
CA, Albany			$56,800					
CA, Fresno								$151,100
FL, Gainesville	$638,900		77,200		$71,400	$95,200		
FL, Miami	272,200						$65,800	140,500
FL, Orlando	409,300							
HI, Honolulu		$683,900	2,766,200	$793,100		887,300	88,700	465,300
MD, Beltsville		62,000	124,000			62,000		58,000
TX, Weslaco					841,100			637,800
TOTAL	$1,320,400	$745,900	$3,024,200	$793,100	$912,500	$1,044,500	$154,500	$1,452,700

TOTAL Fruit Fly Research $9,447,800

Date: March 3, 1993
Contact Person: James R. Coppedge
Telephone: (301) 504-5541

Issue Briefing Paper - FY 1994

1. Subject: Status of Fruit Fly Research Programs in Hawaii

2. Nature and Background of Issue:

- Eradication of the four species of fruit flies (medfly, melon, oriental, and Malaysian) from Hawaii will allow significant expansion of tropical and subtropical horticultural crop production for interstate commerce and export.

- Eradication of these pests from Hawaii will significantly reduce the incidence of accidental reintroduction in the mainland U.S., reduce the need for costly eradication programs, and protect/maintain mainland export markets.

- Environmentalists are concerned about the impact of eradication on the environment and non-target, exotic, and/or endangered plants and animals.

- With current funds, the pilot tests for fruit fly eradication feasibility on Hawaii will be completed in about 9-10 years.

- The medfly pilot test to evaluate the feasibility of medfly eradication technology on Kauai/Niihau was initiated September 1990. This test should be completed by the end of 1993.

- A rearing method, an attractant for surveys, and radiation dosages have been developed for the most recently introduced fruit fly--the Malaysian fruit fly.

- The ARS eradication pilot test on medflies was interrupted about 2 months following Hurricane Ineki; however, it is now operational again.

3. ARS Position and Recommended Action:

- ARS continues to place a high priority on all programs which directly support elimination of fruit flies from Hawaii. Currently, we are modifying and testing the technology necessary for Mediterranean fruit fly eradication under Hawaii conditions in a pilot test against a large medfly population in commercial coffee on Kauai.

- It is the responsibility of ARS to develop publicly acceptable technology for fruit fly eradication and demonstrate the efficacy of this technology in pilot tests. Once this technology is developed, it is up to the people of the State of Hawaii to decide if they want an eradication program, and it will be the responsibility of USDA-APHIS to initiate such a program if they deem it operationally feasible.

- ARS will continue to work with APHIS, the University, State, and local government and the private sector to develop and demonstrate through pilot tests, safe and publicly acceptable technology for fruit fly eradication.

4. Funding: Honolulu, Hawaii - $5,862,000
(includes $1,043,000 in commodity treatment research)

Fruit Fly Eradication Program

Mr. DURBIN. What has happened on the fruit fly eradication project in Hawaii during the past 12 months?

Dr. PLOWMAN. During the past year, we released sterile medflies on Kauai at the rate of 100-150 million per week. The release area was expanded from commercial coffee to include remote areas with wild stands of coffee. Helicopters were adapted for fly release and used for the remote sites. The results from these studies indicate that medfly eradication can be achieved in noncommercial host areas using sterile insects alone. However, the eradication from commercial coffee acreages is not operationally feasible. The numbers of sterile flies that would be required to reach the sterile wild fly ratio needed for eradication on the 6000-7000 acres of commercial coffee substantially exceed the production capacity of the APHIS Fruit Fly Rearing Facility at Waimanalo. Field studies were conducted to evaluate a males-only strain of medfly. The results from these studies indicated that male fly releases had several biological advantages over releases of both sexes. The program on Kauai was interrupted approximately 2 months by damage from Hurricane Iniki, but it is now back in full operation.

Mr. DURBIN. What are the plans for the remainder of fiscal years 1993 and 1994?

Dr. PLOWMAN. We plan to conduct field studies to evaluate a genetically derived, males-only strain of medfly and to evaluate non-pesticidal means of reducing medfly populations in commercial coffee. The potential population suppression methods to be evaluated in coffee include augmentative parasite releases and mass trapping with slow release tacky traps. We also plan to initiate studies on the feasibility of eradicating oriental fruit flies from Hawaii.

Mr. DURBIN. By location, what is the budget for this project for fiscal years 1992, 1993, and 1994?

Dr. PLOWMAN. The budget allocated specifically for fruit fly eradication research on Hawaii in fiscal year 1992 was $2,667,000. Estimated budgets for 1993 and 1994 are $3,064,000 and $3,104,000, respectively. Additionally, ARS obligates about 1.5 million dollars in base funds each year to conduct research in support of the eradication pilot studies.

AGRICULTURAL RESEARCH SERVICE
METHYL BROMIDE
ALTERNATIVE TREATMENT RESEARCH

LOCATION	NET TO LOCATION	FY 1993 APPROPRIATED
CA, Fresno	$643,096	$713,314
CA, Salinas	74,339	82,456
CA, Shafter	12,351	13,700
FL, Miami	1,119,240	1,241,448
FL, Orlando	513,489	569,556
GA, Byron	77,107	85,526
GA, Savannah	154,300	171,148
HI, Honolulu	1,468,730	1,629,098
IL, Urbana	86,776	96,251
ME, Orono	27,000	29,948
MD, Beltsville	974,525	1,080,932
MS, Stoneville	169,292	187,777
OR, Corvallis	69,898	77,530
SC, Charleston	420,910	466,868
TN, Jackson	164,711	182,695
TX, College Station	79,081	87,716
TX, Weslaco	1,106,120	1,226,895
WA, Prosser	52,605	58,349
WA, Yakima	237,300	263,210
	--------	--------
	$7,450,870	$8,264,417

METHYL BROMIDE

Mr. Cochran:

Question. EPA has decided to phase out the use of methyl bromide by the year 2000. As you know, methyl bromide is widely used as a soil fumigant for fruits, vegetables, and tree nuts as well as a post-harvest fumigant for many exported agricultural commodities. At the present time, there are no economically viable alternatives to methyl bromide. What is ARS doing to make sure that research on alternatives to methyl bromide is carried out? What steps is ARS taking to coordinate with research efforts of agricultural producers?

Answer. Our scientists have been conducting research to find alternatives to replace chemical pesticides including methyl bromide for soil and commodity treatments. Specifically relating to the proposed ban on methyl bromide, we are conducting soil treatment research in the amount of $2.5 million which focuses on development of crop resistance, biological control, cultural practices and improved chemical control strategies including development of "natural" products. The ARS program to find replacements for methyl bromide for post harvest quarantine and quality maintenance uses currently is about $5.0 million. This research includes heat and cold treatments; controlled atmospheres; improved chemical control agents including fumigants, microbials, and other biorational materials; combination treatments; use of biocontrol agents, and establishment of pest-free areas.

ARS personnel interact regularly with industry representatives in various forums including methyl bromide technical meetings. An ARS representative participates on the United Nations Environment Program Methyl Bromide Technical Alternatives Committee which has several representatives from the U.S. industry. Our National Agricultural Pesticide Impact Assessment Program conducted an indepth analysis of the impact of methyl bromide loss on U.S. agriculture. ARS scientists participated last year with other USDA agencies in a methyl bromide research workshop also attended by industry representatives. We currently are participating with six other USDA agencies in planning a workshop in late June of this year to focus on research needs for alternatives to methyl bromide treatments. Industry observers will attend.

Date: March 3, 1993
Contact Person: Ken Vick
Telephone: 301/504-3321

Issue Briefing Paper - FY 1994

1. Subject: Methyl Bromide Alternative Treatment Research

2. Nature and Background of Issue:
   - Methyl bromide is a halogenated hydrocarbon used as a structural, postharvest commodity, soil fumigant to control insects, weeds, and soil pathogens, including nematodes. It has many critical uses worldwide.
   - The Fourth Meeting of the Parties of the Montreal Protocol meeting in Copenhagen, in November 1992, amended the Montreal Protocol to include methyl bromide as an ozone depleter.
   - Pursuant to provisions of the United States Clean Air Act, U.S. EPA recently sent to the Federal Register an announcement regulating the production of methyl bromide with a complete phaseout of production (and importation) by the year 2000.
   - Loss of methyl bromide as a soil fumigant for agricultural uses will adversely and severely affect crop production in the United States.
   - For some uses, alternative but less effective, more costly, chemicals are still available for pest control for most crops where methyl bromide is used.
   - Methyl bromide is the only satisfactory fumigant for fresh commodities for insect pests, and its loss will have a huge negative impact on U.S. agriculture. Furthermore, many commodities must be fumigated with methyl bromide either on an absolute or "as needed" basis depending on country and commodity to satisfy quarantine regulations.
   - Importation of fresh fruits and vegetables will be drastically curtailed unless substitutes for methyl bromide can be found. For example, last year over 50 million boxes of grapes and stone fruits from Chile were fumigated as a condition of entry into the U.S.

3. ARS Position and Recommended Action:
   - ARS is conducting research to develop alternatives to methyl bromide for both soil fumigation and postharvest uses.
   - Without significant funding increases, ARS will be unable to address many of the present methyl bromide uses.
   - ARS research alternatives to methyl bromide for pest control include use of pathogen-resistant host cultivars, varieties and genotypes; cultural practices, such as crop rotations, use of diversified cover crops, properly timed planting dates, appropriate irrigation, fertilization, soil management, and tillage practices; biological control; and responsible use of available chemicals, including improved application and recovery technology.
   - Major ARS locations where this research is being conducted are Beltsville, MD; Fresno, CA; College Station, TX; and Charleston, SC.
   - ARS is participating with other USDA agencies, the states, and industry to develop research plans to address high priority needs, commodities, and uses.
   - It will take several years to develop, evaluate, and implement alternatives to methyl bromide for soil and postharvest uses.

4. Funding:

	FY 1993
Soil fumigation and postharvest pathogens research ---	$2,456,648
Stored postharvest commodities research ----	$4,994,222